

# **TP\_CC SAN DIEGO iGEM TEAM**



*Proudly presents:*

**a comprehensive guide on how  
to start a successful iGEM team**

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# What you can expect

In this document, you will learn about all the essential aspects of starting and maintaining an iGEM team. We realize that starting an iGEM team from scratch can be an intimidating process, so we wrote this guide to provide future iGEM teams with helpful examples of research techniques and lectures. In addition, we will share some valuable advice on how to effectively organize the team so it remains productive throughout the course of the year.

This guide is targeted towards high school students who wish to join in on all the iGEM fun!

# Starting a Team

## **Starting an iGEM club at your school**

For this step, you will have to follow your school's specific guidelines on creating a club, which can vary greatly depending on which school you attend. Nevertheless, it is important to find a supporting teacher who hopefully has some background knowledge about synthetic biology and has a classroom that your team can use for your team meetings. Also, don't forget to advertise your club on club day, since the more people you have interested, the better it is!

## **Getting access to a lab**

A key part of the iGEM competition is the lab component. Therefore, you will need to gain access to a lab. If your high school already has a lab that fulfills all the basic equipment requirement, including, but not limited to PCR machines, centrifuges, incubators and shakers (37 degree Celsius), and freezers (4 degree Celsius, -20 degree Celsius, and -80 degree Celsius), great! If not, you can contact a nearby university/high school or purchase the materials yourself.

## **Register your team for the official iGEM competition**

Most of the information is available on the official iGEM website. Keep in mind that the team registration fee is currently \$4000 and that a team may not exceed 15 members. Registration usually begins in early spring.

# Basic Team Structure

If your team consists of more than 5 people, it is often practical to divide up your team into subgroups that focus on specific areas of the competition.

## **Team leader**

The team leader is responsible for organizing and motivating the team in general. He or she must be up to date with the progress of each sub division throughout the whole project.

## **Lab team**

The lab team is responsible for carrying out the plasmid design and the experiment component of the project. Therefore, they must have a solid background in biology and chemistry. If possible, try to find a mentor who has previous experience in synthetic biology to help with the work. The team also needs to write entries in a lab notebook that records the progress of the experiment in detail. Notebook entries should include what progress has been made on the experiment for that day, as well as what conditions your samples are in when the day's experimenting is complete.

## **Web team**

The iGEM competition requires the team to design a wiki. Since HTML and CSS are fairly easy to learn, the team members don't necessarily need to have prior programming knowledge. Although the default wiki page format that is given to your team will be sufficient in that all information about your team and project can be inputted, it is recommended that you style your page according to your project to give it a unique quality, or if your team wishes to try to earn an award for best website design.

## **Human Practices team**

The human practices team is responsible for researching the real life applications of the project idea and bringing synthetic biology to a wider audience. For example, the members can make educational videos or give lectures about synthetic biology at a nearby library.

## **Poster team**

The poster team is responsible for designing the poster that is a presentation supplement on competition days. The team also designs the t-shirt and the banner, which will represent your team at the Giant Jamboree. Dimensions and other requirements are released on the official iGem site.

# Fundraising

Since the team registration and lab supplies are costly, fundraising is vital if you want to build a successful iGEM team. It is very important to start fundraising as early as possible since you need to have all the money for the team registration by early spring. Through personal experience, we have found that it is more efficient to get the whole team involved with the fundraising process.

## **School sponsor**

Ideally, your school is willing to pay for part of the team registration fee. However, since your club is new, it may be difficult for the school to approve.

## **Food and other sales**

Although your team can make foods or snacks by yourselves, it is easier and safer to buy things from a supermarket or grocery store and resell them for a higher price. The best times to sell things are during lunch or after school, when large crowds of people will pass by your stand. However, make sure to follow the rules of the vicinity you are selling in, whether it be at school or in a public area. While food is generally the easiest to sell, you can sell other things such as services like car washes or make small souvenirs to sell.

## **Restaurants**

Certain restaurants are willing to support school fundraising. Essentially, your club can receive anywhere from 10-20% of the profit that night from your school's students who ate at the restaurant. If you are in the US, restaurants such as Applebee's, California Pizza Kitchen, Chipotle, Panda Express, and Subway offer fundraising opportunities. It's better to host the fundraising event on consecutive nights and advertise the event several days before at your school and in your community. Holding up banners and handing out flyers are two effective ways of spreading the information.

## **Asking biotech companies**

By emailing biotech companies, you can receive aid in forms of money or lab equipment. In the email, be sure to state the exact nature of your team and how you will include the companies' logos on your banner and poster as sponsors.

## **Asking the club members to contribute**

You've done all of the above and you're still short of your fundraising goal. At this point, the team might have to ask for parent donations. Ask for a reasonable amount that would be sensible towards students' families and beneficial towards the club. You probably will need to make a presentation detailing how the money will be used and how donations will benefit the club—it is your team's obligation to inform the parents how their money is being spent.

# Research and Project Idea

Once you have your team assembled, the next thing you should do is come up with a project idea. On the iGEM website, there is a list of past projects that can serve as your inspiration. At the beginning of the school year, your iGEM club should host weekly meetings to brainstorm project ideas and organize fundraising events. Meeting in person is crucial to getting things done on time.

## **Research techniques**

The team leader should create a google doc and share it with all the members. During the meetings and at home, each of the members should contribute to the doc his/her idea and back the idea up with an article. The member should write a short summary of what the article is about and include a link to the article. Members should feel free to include any idea that seems feasible and impactful.

## **Reliable sources**

Remember to use reliable sources to search for articles associated with your research. Websites such as NCBI, Scientific American, Popular Science, and other scientific magazines are great for researching potential project ideas. However, ideas can come from a variety of sources outside of articles. Informational websites and other online sources or videos can provide valuable advice on synthetic biology concepts and lab techniques. News websites such as Time, NPR, and BBC are some examples of sources that are easily accessible and reliable.

## **Choosing a project**

After compiling all the brainstorm ideas, the team as a whole should systematically rate certain ideas based on viability of implementation and its originality with respect to past iGEM projects. When you eliminate the potential ideas down to four or five, you now have to conduct extensive research into all the aspects of the ideas, including the current issues, gene sequences, applications, and how the experiment will proceed. This process is going to take a long time and a lot of compromises between the team members, but don't get frustrated, since you will all decide on a winning project idea in the end.

# Tips for Productivity

The smaller the group is, the more productive you will be. With smaller groups, team members are able to easily communicate with each other. Larger groups tend to exclude certain ideas/opinions, making a brainstorming session or a review meeting vulnerable to being unproductive.

## **Having definite research goals**

The leaders of each team should designate tasks to each member to complete. For example, instead of saying “research more into the topic”, you should say “find additional applications of this idea” or “find the genetic sequence of this specific gene”.

## **Regularly update the entire team**

The team should constantly know what happens during and between meetings in order to prevent miscommunication and to update members who may have to miss certain meetings. This is mainly the task of the team leader and could be accomplished through frequent emails.

## **Don't wait until summer**

Due to the fact that the competition is around September, the team might procrastinate until summer to start. However, this is not ideal, especially for the lab team, since the plasmid sequences that your team orders from the suppliers probably will take a long time to create. Teams also have to account for the issue of faulty genes and re-ordering of supplies.



# Basic Synthetic Biology Knowledge

Whether you are trying to educate yourself or to teach another, the powerpoints below cover most of the basic synthetic biology knowledge that you need to know to be on the team. We will cover the following topics in separate pdfs located on our team wikia. In addition, we explain important lab procedures in detail in a separate ebook.

1. Translation / Translation
2. iGem PCR
3. Plasmid Digestion
4. Transformations
5. Inverse PCR
6. Primer Design
7. Promoter Regions

# Timeline

**September to October:** Attracting people to join your club

**October to March:** Giving lectures to newbies on the basic synthetic biology terms and processes

**September to February:** Fundraising for the team funding

**September to March:** Brainstorming and finalizing project idea

**February to March:** iGEM team registration

**March to April:** Design and order plasmids (if needed)

**February to April:** Divide up the team

**April to August:** Human practices interviewing, giving lectures, and researching applications

**May to August:** Experiments in lab and lab notebook

**June to August:** Web team coding for the wiki.

**July to September:** Poster team start designing the poster, t-shirt, and banner

**June to August:** Start finalizing the team to 15 members if you haven't already

**August to September:** Choosing team members to attend and present at the Jamboree

**September:** Jamboree competition days!